1. Non-Technical Summary

A 1000 word (maximum) summary of the main research results, in non-technical language, should be provided below. The summary might be used by ESRC to publicise the research. It should cover the aims and objectives of the project, main research results and significant academic achievements, dissemination activities and potential or actual impacts on policy and practice.

This is a study of: the representations of maths and mathematicians in popular culture; the ways that they influence learners’ relationships with the subject and their choices of whether or not to study maths; and of the role of social class, gender and ethnicity in these representations and processes.

Notwithstanding a slight increase last year, in recent years there has been a reduction in the number of people choosing to study maths in England and Wales. This is accompanied by many people having difficult feelings towards the subject which affect their ability to engage mathematically both at school and as adults. Alongside these, recent years have seen both an increasing engagement in popular culture and an explosion of popular mathematical images from Russell Crowe in *A Beautiful Mind* to sudokus, from *Runescape* to *Deal or No Deal*. In this research we explored these representations, looking at the ways that they construct maths and people doing maths. We used extensive qualitative research, supported by a quantitative survey, to find out how people understand these images, the meanings they give to them and that they make from them, trying to unpick the relationship between images and identities. We also looked at how these images and their effects are connected to social class, gender and ethnicity, linking to previous research on how these dimensions affect participation and achievement in maths.

During the project we collected data from the following groups:

- Year 10 - 11 students in three comprehensive schools, one in London, one in a large town in the South and one in a rural area in the South West.
- University students about half of whom were in maths and half in humanities and social science courses, and about half of whom were in post-1992 and half in Russell group universities.

The data consisted of: a survey of 556 Year 10 students in three schools and 100 undergraduates, 27 focus groups with 129 of these participants and individual interviews with 49 of them. We analysed the survey by comparing the responses of those who were planning to or had chosen maths with those who were not or had not, and looking at differences by gender and social class; we compared respondents’ feelings about maths, their use and awareness of popular culture forms of maths, their family’s relationship with maths and the factors influencing their choice as to whether to continue to study maths or not. For the focus groups, we coded the data to look at participants’ feelings about: school/university maths, mathematicians, differences in people’s engagement in maths, specific images of people doing maths, sudokus and the nature of maths. For the interviews, we used fantasy, memory and visual images to stimulate participants to talk about their relationships with maths. Analytically, we combined a holistic approach, looking at each interview in its entirety, with a cross-sectional approach looking at all the
responses in a particular area. We also built up an archive of popular culture texts relating to maths and mathematicians that were mentioned in the survey, and carried out a detailed analysis of over 40 of these, looking for what they say about maths, about people doing maths and about difference.

Our main findings are that:

- Popular cultural texts create a range of possible meanings and that the ways that they are read by someone depends on the resources they bring to them; for example, whether a text can be read as mathematical depends on someone's understanding of maths. In particular we found that people with a positive relationship with maths are more likely to see maths and mathematicians within popular culture and that for some people, usually male, a relationship with popular cultural texts can support a developing relationship with maths, with specific images being something they want to become.

- Many people have clichéd views about maths and mathematicians which discourage them from choosing to study the subject after GCSE and inhibit their engagement with it in adulthood. A substantial majority of both Year 11 students and university undergraduates saw maths as little more than numbers and mathematicians as old, white, middle-class men. Their images of maths were often narrow, inaccurate and confined to numbers and basic arithmetic. They saw mathematicians as lacking social skills, having no personal life outside of maths and as obsessionial. Our research linked these clichés with many of the popular cultural representations of maths and mathematicians, and to negative attitudes to the subject.

- Participants were aware that the images they had and that were presented to them in popular culture were clichés and often both used them and distanced themselves from them. For example, one participant in a Year 11 focus group said, a mathematician is “a very sort of stereotypical geek type of person, but obviously they aren’t all like that”. However, they were unable to produce more positive ideas about maths and mathematicians because of the lack of alternatives available within their experiences of school maths and of popular culture.

- While popular cultural discourses are a significant way in which these clichéd meanings are circulated, they are not the only one. School maths and family influences are at least as important, and both can counter the effects of popular culture or support them.

- Despite our focus on a few specific representations, maths is both ubiquitous and invisible in popular culture, with a huge number of texts coming up only once or twice on the survey and for a range of different reasons. The focus group and interview interactions suggest that focusing on these examples has pedagogic possibilities for opening up different ways of relating to maths.

This research has attracted interest from academics in maths education, sociology of education, gender studies and cultural studies, from maths education organisations working in school and university education, from people who produce ‘popular maths’ and from the press. Funding for further work in this area has been secured from the UK Resource Centre for Women in Science Engineering and Technology.